

IN THE CLAIMS:

Please cancel claims 1-51 without prejudice or disclaimer, and substitute new claims 52-102 therefor as follows:

Claims 1-51 (Cancelled).

52. (New) A solid oxide fuel cell comprising a cathode, an anode and at least one electrolyte membrane disposed between said anode and said cathode, wherein said anode comprises

a cermet including a metallic portion and an electrolyte ceramic material portion, said portions being substantially uniformly interdispersed, said metallic portion having a melting point equal to or lower than 1200°C and being substantially inert as catalyst for hydrocarbon oxidation; said cermet having a porosity equal to or higher than 40%, and being activated by a catalyst for hydrocarbon oxidation in an amount equal to or lower than 20 wt%.

53. (New) The solid oxide fuel cell according to claim 52, wherein the metallic portion is selected from a metal selected from copper, aluminum, gold, praseodymium, ytterbium, cerium, and alloys thereof.

54. (New) The solid oxide fuel cell according to claim 53, wherein the metallic portion is copper.

55. (New) The solid oxide fuel cell according to claim 52, wherein the metallic portion has a melting point higher than 500°C.

56. (New) The solid oxide fuel cell according to claim 52, wherein the weight ratio metallic portion/ceramic portion in the cermet is 9:1 to 3:7.

57. (New) The solid oxide fuel cell according to claim 52, wherein the weight ratio metallic portion/ceramic portion in the cermet is 8:2 to 5:5.

58. (New) The solid oxide fuel cell according to claim 52, wherein the ceramic material has a specific conductivity equal to or higher than 0.01 S/cm at 650°C.

59. (New) The solid oxide fuel cell according to claim 58, wherein the ceramic material is selected from doped ceria and $\text{La}_{1-x}\text{Sr}_x\text{Ga}_{1-y}\text{Mg}_y\text{O}_{3-\delta}$ wherein x and y are 0 to 0.7, and δ is from stoichiometry.

60. (New) The solid oxide fuel cell according to claim 59, wherein ceria is doped with gadolinia or samaria.

61. (New) The solid oxide fuel cell according to claim 52, wherein the ceramic material is yttria-stabilized zirconia.

62. (New) The solid oxide fuel cell according to claim 52, wherein the cermet has a specific surface area equal to or lower than 5 m²/g.

63. (New) The solid oxide fuel cell according to claim 62, wherein the cermet has a specific surface area equal to or lower than 2 m²/g.

64. (New) The solid oxide fuel cell according to claim 52, wherein said catalyst is selected from nickel, iron, cobalt, molybdenum, platinum, iridium, rhutenium, rhodium, silver, palladium, cerium oxide, manganese oxide, molybdenum oxide, titania, samaria-doped ceria, gadolinia-doped ceria, niobia-doped ceria and mixtures thereof.

65. (New) The solid oxide fuel cell according to claim 64, wherein said catalyst is selected from nickel, cerium oxide and mixtures thereof.

66. (New) The solid oxide fuel cell according to claim 52, wherein said catalyst is present in an amount of 0.5 wt% to 15 wt%.

67. (New) The solid oxide fuel cell according to claim 52, wherein said catalyst has a specific surface area higher than $20 \text{ m}^2/\text{g}$.

68. (New) The solid oxide fuel cell according to claim 67, wherein said catalyst has a specific surface area higher than $30 \text{ m}^2/\text{g}$.

69. (New) The solid oxide fuel cell according to claim 52, wherein the cathode comprises a metal selected from platinum, silver, gold and mixtures thereof, and an oxide of a rare earth element.

70. (New) The solid oxide fuel according to claim 52, wherein the cathode comprises a ceramic selected from

$\text{La}_{1-x}\text{Sr}_x\text{MnO}_{3-\delta}$, wherein x and y are independently equal to 0 to 1, and δ is from stoichiometry; and

$\text{La}_{1-x}\text{Sr}_x\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-\delta}$, wherein x and y are independently equal to 0 to 1, and δ is from stoichiometry.

71. (New) The solid oxide fuel cell according to claim 69, wherein the cathode comprises doped ceria.

72. (New) The solid oxide fuel cell according to claim 52, wherein the cathode comprises a combination of materials comprising a metal selected from platinum, silver, gold and mixtures thereof, and an oxide of a rare earth element and a ceramic selected from

$\text{La}_{1-x}\text{Sr}_x\text{MnO}_{3-\delta}$, wherein x and y are independently equal to 0 to 1, and δ is from stoichiometry; and

$\text{La}_{1-x}\text{Sr}_x\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-\delta}$, wherein x and y are independently equal to 0 to 1, and δ is from stoichiometry.

73. (New) The solid oxide fuel cell according to claim 52, wherein the electrolyte membrane is selected from yttria-stabilized zirconia, $\text{La}_{1-x}\text{Sr}_x\text{Ga}_{1-y}\text{Mg}_y\text{O}_{3-\delta}$ wherein x and y are 0 to 0.7, and δ is from stoichiometry, and doped ceria.

74. (New) The solid oxide fuel cell according to claim 52, wherein the electrolyte membrane comprises the same material of the electrolyte ceramic portion of the cermet.

75. (New) A method for producing energy comprising the steps of:
a) feeding at least one hydrocarbon fuel into an anode side of a solid oxide fuel cell comprising:

an anode comprising a cermet comprising a metallic portion and an electrolyte ceramic material portion, said portions being substantially uniformly interdispersed, said metallic portion having a melting point equal to or lower than 1200°C and being substantially inert as catalyst for hydrocarbon oxidation; said cermet having a porosity equal to or higher than 40%, and being activated by a catalyst for hydrocarbon oxidation in an amount equal to or lower than 20 wt%;

a cathode; and

at least one electrolyte membrane disposed between said anode and said cathode;

b) feeding an oxidant into a cathode side of said solid oxide fuel cell; and
c) oxidizing said at least one fuel in said solid oxide fuel cell, resulting in production of energy.

76. (New) The method according to claim 75, wherein the hydrocarbon fuel is substantially dry.

77. (New) The method according to claim 75, wherein the hydrocarbon fuel is methane.

78. (New) The method according to claim 75, wherein the hydrocarbon fuel is directly oxidized at the anode side.

79. (New) The method according to claim 75, wherein the hydrocarbon fuel is internally reformed at the anode side.

80. (New) The method according to claim 75, wherein the solid oxide fuel cell operates at a temperature of 400°C to 800°C.

81. (New) The method according to claim 80, wherein the solid oxide fuel cell operates at a temperature of 500°C to 700°C.

82. (New) A process for preparing a solid oxide fuel cell comprising a cathode, an anode and at least one electrolyte membrane disposed between said anode and said cathode wherein said anode comprises a cermet including a metallic portion and an electrolyte ceramic material portion; comprising the steps of:

providing a cathode;

providing at least one electrolyte membrane; and

providing an anode

wherein the step of providing the anode comprises the steps of:

a) providing a precursor of the metallic portion, said precursor having a particle size of 0.2 μm to 5 μm ;

b) providing the electrolyte ceramic material having a particle size of 1 μm to 10 μm ;

- c) mixing said precursor and said ceramic material to provide a starting mixture;
- d) heating and grinding said starting mixture in the presence of at least one first dispersant;
- e) adding at least one binder and at least one second dispersant to the starting mixture from step d) to give a slurry;
- f) thermally treating the slurry to provide a pre-cermet;
- g) reducing the pre-cermet to provide a cermet; and
- h) distributing at least one catalyst for hydrocarbon oxidation into the cermet.

83. (New) The process according to claim 82, wherein the slurry resulting from step e) is applied on the electrolyte membrane.

84. (New) Process according to claim 82, wherein step h) comprises impregnating the pre-cermet with a precursor of the catalyst which is subsequently reduced during a reducing step.

85. (New) The process according to claim 82, wherein step h) comprises impregnating the cermet with a precursor of the catalyst which is subsequently reduced during an additional reducing step i).

86. (New) The process according to claim 82, wherein the precursor of the metallic portion is an oxide.

87. (New) The process according to claim 86, wherein the oxide is a copper oxide.

88. (New) The process according to claim 86, wherein the oxide is CuO.

89. (New) The process according to claim 82, wherein the precursor has a particle size of 1 to 3 μm .

90. (New) The process according to claim 82, wherein the ceramic material has a particle size of 2 to 5 μm .

91. (New) The process according to claim 82, wherein step d) is carried out more than one time.

92. (New) The process according to claim 82, wherein the at least one first and second dispersants are selected from ethanol and isopropanol.

93. (New) The process according to claim 82, wherein the at least one first dispersant is the same as the at least a second dispersant.

94. (New) The process according to claim 82, wherein the binder is soluble in the at least one second dispersant.

95. (New) The process according to claim 82, wherein the binder is polyvinylbutyral.

96. (New) The process according to claim 82, wherein step f) is carried out at a temperature of 700°C to 1100°C.

97. (New) The process according to claim 96, wherein step f) is carried out at a temperature of 900°C to 1000°C.

98. (New) The process according to claim 82, wherein step g) is carried out at a temperature of 300°C to 800°C.

99. (New) The process according to claim 98, wherein step g) is carried out at a temperature of 400°C to 600°C.

100. (New) The process according to claim 82, wherein step g) is performed with hydrogen containing from 1 vol.% to 10 vol.% of water.

101. (New) The process according to claim 100, wherein hydrogen contains from 2 vol.% to 5 vol.% of water.

102. (New) A cermet comprising a metallic portion and an electrolyte ceramic material portion, said portions being substantially uniformly interdispersed, said metallic portion having a melting point equal to or lower than 1200°C and being substantially inert as catalyst for hydrocarbon oxidation; said cermet having a porosity equal to or higher than 40%, and being activated by a catalyst for hydrocarbon oxidation in an amount equal to or lower than 20 wt%.